REMARKS

1. Claims 1-19, 22 and 24.

The Examiner rejected claims 1-15 and 17-19 under 35 U.S.C. §103(a) as obvious in light of U.S. Patent No. 4,637,289 to Ramsden combined with U.S. Patent No. 3,946,631 to Malm and U.S. Patent No. 4,117,752 to Yoneda. The Examiner rejected claim 16 as obvious in light of those same patents combined with U.S. Patent No. 5,272,949 to McCullough. The Examiner rejected claims 22 and 24 as obvious in light of Ramsden and McCullough. Applicant traverses those rejections. Applicant has canceled claim 24 without prejudice, so claim 24 will not be discussed below.

Whether the claims are obvious depends on the following factors: 1) the scope and content of the prior art, 2) the differences between the prior art and the claims at issue, 3) the level of ordinary skill in the pertinent art, and 4) secondary considerations such as a long felt need, the failure of others to satisfy that need, and industry awards and recognition. Graham v. John Deere, 383 U.S. 1, 148 USPQ 459 (1966). These factors are discussed below.

Scope and Content of the Prior Art

It is questionable whether the Ramsden, Malm, Yoneda and McCullough patents cited by the Examiner are analogous to the pending claims, and therefore within the proper scope and content of the prior art, because the references do not describe miter saws. In fact, the references do not describe portable or bench top tools at all; rather, they describe industrial machines that are different in construction, application and operation.

Ramsden discloses an industrial up-cut saw with a blade that moves up from under a table to cut a work piece held on the table. The blade moves up through a slot in the table, and the work piece is held in place over the slot by a guard/clamp. The saw includes a sensor

mounted on the guard to sense the presence of a work piece. If the sensor fails to sense the presence of a work piece, then the sensor prevents operation of the saw. Up-cut saws are used in industry to make fast, repetitive cuts, often 20-40 cuts per minute. They are typically operated by a foot switch that a user depresses to cycle the blade up and down.

Malm discloses an up-cut saw similar to Ramsden, but without the sensor.

Yoneda discloses a band saw with an emergency system for stopping the blade. The blade is a metal band that travels around wheels. The emergency system includes an electric circuit intended to recognize what the patent calls "the electric charge potential" of a human body if an operator contacts the blade. The system also includes "an electromagnetic clamp brake" to clamp the band blade and "an electromagnetic brake" to stop a pulley connected to a motor. Band saws are typically used for ripping (cutting wood along its length with the grain of the wood) or for cutting curves. Band saws are operated by a user pushing a workpiece against the blade.

McCullough discloses a band saw and a meat skinning machine. The machines include a system to stop either a blade or a toothed shaft upon contact with a metal glove worn by a user.

It is questionable whether these references are analogous to miter saws because of the differences in construction, application and operation. However, whether the references are analogous need not be determined at this point because of the differences between the claims and cited references.

Differences Between the Prior Art and the Claims

Claims 1-19 and 22 all describe a "miter saw." The specification describes miter saws as follows:

> Miter saws are a type of woodworking machinery used to cut workpieces of wood, plastic and other materials. Miter saws include a base upon which workpieces are placed, and a circular saw blade is mounted on a swing arm above the base. A person uses a miter saw by placing [a] workpiece on the base beneath the blade and then bringing the blade down via the swing arm to cut the workpiece. (Publication ¶ 3)
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> ... Typically, miter saw 1510 includes a base or stand 1512 adapted to hold the workpiece to be cut. A swing arm 1514 is pivotally coupled to base 1512 to allow the arm to pivot downward toward the base. Attached to arm 1514 is a housing 1516 adapted to at least partially enclose a circular blade 40. A motor assembly 16 is coupled to the housing, and includes a rotating arbor 42 on which the blade is mounted. Motor assembly 16 includes a handle 1518 with a trigger 1520 operable to run the saw. Blade 40 rotates downward toward base 1512. An optional blade guard (not shown) may extend from the bottom of housing 1516 to cover any portion of the blade exposed from the housing. A person uses miter saw 1510 by placing [a] workpiece on base 1512 beneath the upraised blade and then bringing the blade down via swing arm 1514 into what may be thought of as a cutting zone to cut the workpiece. (Publication ¶ 30)

All of claims 1-19 and 22 expressly recite a "miter saw." The Ramsden, Malm, Yoneda and McCullough patents, in contrast, do not disclose miter saws. Specifically, they do not disclose a saw having a base with a swing arm and blade above the base and a handle associated with the swing arm so a user can pivot the swing arm and blade down into contact with a workpiece on the base.

The Examiner recognizes that an up-cut saw as disclosed in Ramsden is not a miter saw, but says an up-cut saw is analogous to a miter saw. (See page 4 of the Office Action). Applicant disagrees that an up-cut saw is analogous to a miter saw. Up-cut saws are stand-alone saws designed for industrial settings. They typically weigh several hundred pounds. An up-cut saw typically includes a large 18"-diameter blade that is completely enclosed within a cabinet. The

blade is mounted on a large spindle, and a motor, also enclosed in the cabinet, drives the spindle via a belt. Up-cut saws further include a guard that clamps a workpiece to the tabletop before cutting. A pneumatic system within the cabinet moves the guard down as it moves the blade up. Up-cut saws are used to make fast, repetitive cuts. In use, a person places a workpiece on the tabletop and steps on a foot switch. The clamp then comes down onto the workpiece and the blade moves up from under the table to make the cut. After the cut the blade moves down into the cabinet and the clamp moves up. The user may then slide a new workpiece into place to repeat the process. A user may not control the motion of the blade toward the workpiece in an up-cut saw, and an up-cut saw is not portable and cannot be conveniently used.

Miter saws are different in that they are portable and designed for home builders and hobbyists. Miter saws have a base designed to rest on a horizontal surface such as a workbench or the bed of a pick-up truck. A swing arm is attached to and extends above the base, and a handle is on the swing arm so that a user can move the swing arm down to make a cut. A motor is mounted on the swing arm to spin the blade. The base, swing arm, blade and motor configuration in a miter saw is very different from the structure of an up-cut saw. These differences allow the user to control the motion of the blade toward the workpiece so that the cut can be made slowly or only partially through a workpiece.

Applicant believes its claims distinguish the cited references by claiming "a miter saw." Nevertheless, applicant has amended the pending claims to expressly require a support structure or base, a swing arm above and pivotally attached to the support structure or base, and a handle adapted so that a user may pivot the swing arm down. None of the cited references disclose these limitations.

Claims 1-8 also require "a detection system to detect contact between a person and the blade," and "a reaction system adapted to create an impulse against movement of the blade into the cutting zone upon detection by the detection system of contact between the person and the blade." Nothing in the prior art shows or suggests creating an impulse against movement of the blade into the cutting zone upon detection of accidental contact between a person and the blade.

Ramsden discloses a system to detect whether a workpiece is on a work surface. Ramsden does not, however, detect accidental contact between a user and the blade. Ramsden also fails to suggest creating an impulse against movement of the blade into a cutting zone in response to accidental contact with the blade. Malm simply discloses a standard up-cut saw without any discussion about detecting accidental contact with the blade or creating an impulse against movement of the blade. Yoneda discloses a system that tries to stop a band saw blade when a person contacts the blade, but nothing in Yoneda suggests creating an impulse against movement of a blade into a cutting zone. In fact, it would be counterintuitive for Yoneda to make that suggestion because the blade in a band saw does not move into a cutting zone; rather, the workpiece is pushed past the blade. McCullough discloses another band saw, and like Yoneda, does not suggest creating an impulse against movement of the blade into a cutting zone. Thus, the cited references all fail to disclose a reaction system as required by applicant's claims.

The Examiner states, "If the brake mechanism [of Yoneda] were located on a portion of the rotating cutting blade that was going towards the cutting zone, the angular momentum of the blade would create an opposite impulse upon application of a brake and therefore the blade would move away from the cutting zone. " (See page 4 of the Office Action.) That is incorrect. If a brake mounted anywhere on the swing arm of a miter saw engaged the rotating blade, the angular momentum of the blade would tend to move the swing arm and blade further into the

cutting zone regardless of where the brake was positioned relative to the blade. Specifically, when the brake engaged the blade, the angular momentum of the blade would be transferred to the swing arm through the brake. The swing arm would then try to spin in the same direction as the blade due to the conservation of angular momentum. Rotation of the swing arm in the direction of the rotation of the blade would pivot the swing arm around its connection with the support structure and move it and the blade down into the cutting zone because that is the only movement it can make in the same direction as the blade was spinning. Applicant is submitting the Declaration of Stephen F. Gass, a Ph.D. physicist and one of the named inventors, to explain this point. (See ¶¶ 6-7 of the Gass Declaration.)

The Examiner further states, "Yoneda also teaches the use of a second mechanism B that creates an electromagnetic impulse against movement of the blade into the cutting zone." (See page 4 of the Office Action.) That, too, is incorrect. The electromagnetic brake B in Yoneda "grips a brake plate integral with the pulley 11 to brake the pulley 11 to a halt." (See Yoneda, column 2, lines 40-41.) Nothing in Yoneda says or suggests that the electromagnetic brake creates an impulse against movement of the blade into a cutting zone. In fact, the band saw disclosed in Yoneda is constructed so that the blade cannot move into a cutting zone as required by applicant's claims; rather, the blade remains in place as a user pushes the workpiece past the blade. This is opposite to a miter saw where the workpiece is stationary and the user moves the blade into the workpiece.

Claims 2-8 also include additional limitations that distinguish the cited references. Claim 2 requires a reaction system adapted to move the blade away from the cutting zone. Claim 3 requires a reaction system that is also adapted to stop the blade. Claim 4 requires a brake mechanism that engages the blade, and that engagement with the blade creates the impulse

against movement of the blade into the cutting zone. Claim 5 specifies the engagement of the brake mechanism with the blade moves the blade away from the cutting zone. Claim 6 specifies the engagement of the brake mechanism with the blade creates the impulse at least partially due to the angular momentum of the blade. Claim 7 requires a brake mechanism adapted to maintain an operative position relative to the blade as the blade moves into the cutting zone. Claim 8 requires a first mechanism to stop the blade and a second mechanism to create the impulse. None of the cited references disclose or suggest these limitations.

Claims 9-15 require a miter saw with "a support structure," a "swing arm above and pivotally attached to the support structure," "a blade supported by the swing arm," a handle associated with the swing arm and adapted so that a user may pivot the swing arm and blade into the cutting zone," "a motor adapted to drive the blade," "a detection system adapted to detect contact between the blade and a person," and "a brake mechanism adapted to stop rotation of the blade upon detection by the detection system of contact between the blade and the person." The Examiner says such a miter saw would have been obvious if you added the detection system of Yoneda and the switch of Malm to the up-cut saw in Ramsden because an up-cut saw is analogous to a miter saw. However, as explained, an up-cut saw if very different from a miter saw. Even if you combined the saws shown in Yoneda, Malm and Ramsden, the resulting saw still would not have a swing arm above and pivotally attached to a support structure or a handle associated with the swing arm and adapted so that a user may pivot the swing arm and blade into the cutting zone as required by claims 9-15. Thus, the amended claims cannot be obvious in light of Ramsden, Malm and Yoneda because those references do not disclose all of the limitations of the claims. MPEP §2143.03

Additionally, combining the electromagnetic clamp brake or pulley brake of Yoneda with the up-cut saws of Ramsden and Malm would result in a non-functional system because of the differences between band blades and up-cut blades. Yoneda's electromagnetic clamp brake is designed to clamp the sides of a band blade that travels around wheels. The blade itself is thin and has limited momentum because of its limited mass. The blade in an up-cut saw, in contrast, is a solid disc at least 18" in diameter that spins around a central axis. The blade has significant mass and substantial angular momentum when spinning. There is no suggestion or teaching that the electromagnetic clamp brake of Yoneda could be used to stop a large circular blade in response to accidental contact with the blade and it is unlikely that such a brake would be practical given the greater angular momentum of the circular blade and the significant amount of force that would be required to stop the circular blade by clamping its sides. Additionally, there is no teaching as to how to position, mount or support an electromagnetic clamp brake in an up-cut saw so that it can apply and withstand the forces involved in stopping the circular blade. An electromagnetic pulley brake would face the same issues. How can you provide enough force to stop the blade in an up-cut saw given its substantial angular momentum, and how can you position, mount and support the brake in the saw? Also, if you apply a braking force to the pulley, how do you prevent the blade from slipping on its spindle? Thus, there is no reasonable expectation of success in applying the brakes of Yoneda to the up-cut saw of Ramsden, and without such a reasonable expectation the claims cannot be obvious. MPEP §2143.02

There is also no teaching in any of the references about how to incorporate the contact detection system of Yoneda in the up-cut saw of Ramsden. The blade in an up-cut saw is grounded because it is mounted on a metal spindle supported within the cabinet. Because the blade is grounded, no signal would be generated from accidental contact between a person and

the blade so no signal could be directed to Yoneda's amplifier. Without such a signal, Yoneda's detection system could not work. Also, Yoneda discloses a bearing 16 held in contact with the blade to electrically couple the blade to the amplifier. (See Yoneda, column 2, lines 26-30.) The bearing rolls along the side of the blade as the blade travels around the wheels because the blade moves linearly relative to the bearing. Because the bearing rolls along the side of the blade and because the blade extends between wheels, the bearing can push against the blade to ensure contact with the blade. However, the blade in an up-cut saw spins around an axis; it does not move linearly relative to the bearing. Thus, the bearing would slide over the blade rather than roll. This sliding would cause the bearing to wear, which could result in intermittent contact with the blade. Also, because the blade in an up-cut saw is a disc rather than a band, the bearing cannot exert much pressure on the blade without deflecting the blade (which would degrade the quality of cut). However, the blade may not be perfectly flat, so the contact between the bearing and blade may be intermittent if the bearing does not press against the blade. These differences support the conclusion that there is no reasonable expectation that the detection system of Yoneda could work in an up-cut saw, and without that reasonable expectation of success the claims cannot be obvious. MPEP §2143.02

There is also no teaching how to use the limit switches of Malm with the detection system of Yoneda. Switches 78 and 84 disclosed in Malm are limit switches that open and close when cams move into and out of contact with the switches. These switches limit the movement of the blade between two points. However, the limit switches do not open and close upon receipt of an electric signal, so they cannot function with the detection system of Yoneda to interrupt the movement of the blade between the two limit points. In other words, the switches operate mechanically when a physical object bumps into them; they do not operate upon receipt of an

electric signal so they would not work with the Yoneda system. In fact, because the switches in Malm are limit switches, they teach away from interrupting the movement of the blade between the two limit points and they teach away from using an electric signal to trigger the switch. Thus, Malm does not disclose a switch capable of receiving a signal from the detection system of Yoneda and then triggering a brake to stop the rotation of the blade.

Claim 16 depends from claim 9, and further requires "a brake pawl adapted to pivot into the teeth of the blade and further adapted so that the teeth cut into the pawl to stop the blade." None of the cited references show a brake pawl adapted so that a blade may cut into the pawl to stop. McCullough shows a meat skinning machine with a pawl 75 that includes a projection 77 "adapted to engage teeth 81 of a pawl wheel 18." (See McCullough, column 6, lines 18-20.) Projection 77 is configured to fit between the teeth in the wheel and abut against one of them. It is not adapted so that a blade may cut into the pawl, as required by the claim.

Additionally, projection 77 would not work with the various blades that are used in a miter saw. Miter saws must be able to accommodate blades with 28 teeth as well as blades with 200 teeth. If projection 77 were made to fit between the 28 teeth, then it would not fit between the 200 teeth. If the projection were made to fit between the 200 teeth, then it would be too small to abut against and stop the blade with 28 teeth. Thus, a projection such as projection 77 disclosed in McCullough will not work with the various blades used in a miter saw, so claim 16 is not obvious in light of that projection.

Claims 17 and 18 require a miter saw with "a linkage between the swing arm and base, where the linkage is configured to cause the swing arm and blade to move away from the cutting region when the brake system brakes the blade." None of the cited references discloses such a linkage, and the Examiner failed to identify any such linkage. Moreover, none of the cited

references teach or suggest moving the blade away from the cutting region when a brake system brakes the blade, as explained above.

Claim 18 further specifies that the "linkage is configured so that the angular momentum of the blade causes the blade to move away from the cutting region when the brake system brakes the blade." Nothing in any cited reference shows a linkage between a blade and a base configured to use the angular momentum of a spinning blade to cause the blade to move away from a cutting region.

Claim 19 describes a miter saw including many of the limitations discussed above, and also including "a housing supported by the swing arm" and "a mounting system holding the blade in the housing." The mounting system "is configured so that the blade pivots into the housing when the brake system brakes the blade." None of the cited references show or suggest a blade that pivots into a housing on the swing arm when a brake system brakes the blade.

Claim 22 requires a miter saw having "a base configured to support a workpiece" and "a swing arm positioned above the base and adapted to move toward a workpiece supported by the base." A blade is "mounted to move with the swing arm" and a handle is associated with the swing arm and "adapted so that a user may move the swing arm and blade toward the workpiece." The claim further requires "a detection system adapted to detect contact between a person and the blade" and "a reaction system adapted to interrupt the movement of the blade and swing arm upon the detection by the detection system of contact between the person and the blade." The swing arm "includes a cam portion," and the saw includes "a pawl adapted to engage the cam portion to stop the movement of the swing arm toward the workpiece upon detection of the dangerous condition." None of the cited references show a swing arm with a cam portion that engages a pawl to stop the movement of the swing arm. The Examiner says it would have been

obvious to use a pawl as shown in McCullough to operate the roller valve 140 of Ramsden to stop the upward movement of the blade in an up-cut saw. (The examiner calls roller valve 140 a cam portion. See Office Action page 5.) However, roller valve 140 in Ramsden acts as a limit switch, not a cam. When the blade in Ramsden moves up to its desired height, it contacts and opens roller valve 140 causing the blade to move down. Thus, roller valve 140 is not a cam on a swing arm which a pawl engages to stop the swing arm from moving down toward a workpiece.

The Level of Ordinary Skill

Applicant has not determined the level of ordinary skill in the art, but assumes it is a mechanical engineer with some experience.

Secondary Considerations

Every year in the United States there are over 90,000 people severely injured with power saws, according to the U.S. Consumer Product Safety Commission, National Electronic Injury Surveillance System, Directorate for Epidemiology, 2001.[1] These are all severe injuries that require a visit to a hospital emergency room. About 10% of these injuries result in amputations. The number and severity of these injuries clearly shows there is a long felt need for safer saws. The fact that others have tried to solve this problem is evidenced by the Ramsden, Yoneda and McCullough patents cited by the Examiner. However, the continued high number of severe injuries shows that those attempts have failed. Fortunately, saws constructed as required by the currently pending claims have the potential to significantly reduce the severity of these injuries. The long felt need for safer saws and the failure of others to satisfy that need supports the conclusion that the claims are non-obvious.

[1] These statistics are publicly available from the U.S. Consumer Product Safety Commission.

Additionally, the technology which is the basis for saws constructed as required by the currently pending claims has been recognized as new and innovative by various entities associated with the woodworking industry, as shown by the following awards (See Gass Decl. ¶8):

- Chairman's Commendation. The U.S. Consumer Product Safety Commission awarded the technology a Chairman's Commendation for significant contributions to product safety. That award was reported nationally on CNN Headline News.

- Challenger's Award. At an International Woodworking Fair in Atlanta, Georgia, the technology won the Challenger's Award, which is the woodworking industry's highest honor. It recognizes the most innovative and technically advanced improvements to woodworking equipment.

- Popular Science – One of the 100 Best New Innovations. The magazine *Popular Science* identified the technology as one of the 100 best new innovations of 2002.

- Workbench Magazine – One of the Top 10 Tools for 2003. *Workbench* magazine included saws incorporating the technology on its list of the top 10 innovative tools for 2003.

- Woodwork Institute of California Endorsement. The Woodwork Institute of California has endorsed the technology, stating:

> As a Trade Association in the construction industry (representing over 250 manufacturers of architectural millwork with an excess of 4,000 employees, all of whom use saws of one type or another) we find your SawStop technology and its potential of eliminating or reducing worker injury of extreme significance. Generally, we would not endorse a commercial product; however the potential benefit to our members and their employees of implementing the SawStop technology on the tools used within our industry overrides such.

- Editor's Choice Award, Tools of the Trade. The magazine *Tools of the Trade* awarded the technology its 2001 Editor's Choice Award in recognition of its significance.

The technology that is the basis for the currently pending claims has also been the subject of extensive media coverage, including national coverage by CNN Headline News, by the television program NEXT@CNN, by the Associated Press, and by Paul Harvey on the ABC Radio Network. (See Gass Decl. ¶9.) That media coverage indicates that the technology is novel and noteworthy. Numerous magazines have published reports about the technology, and have referred to it as "revolutionary" and "ingenious." Id.

Summary Concerning Non-Obviousness

The significant differences between the amended claims and the cited references, the long felt but unsolved need for saws constructed as required by applicant's claims, and the industry recognition and awards given to the technology all support the conclusion that applicant's amended claims are not obvious.

2. Claims 20, 21, 23, 25, 26, 28, and 29.

The Examiner rejected claims 20, 21, 23, 25, 26, 28, and 29 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,637,289 to Ramsden. Applicant traverses that rejection. Applicant has canceled claims 23 and 25 without prejudice, so those claims will not be discussed below.

Claims 20 and 21 both recite a "miter saw," and a miter saw is different from the up-cut saw disclosed in Ramsden, as explained above. Therefore, applicant believes original claims 20 and 21 distinguish Ramsden. Nevertheless, claims 20 and 21 have been amended to expressly require "a base configured to support a workpiece to be cut" and "a swing arm positioned above the base and adapted to move toward a workpiece supported by the base." Ramsden does not disclose such a swing arm. The claims also require "a handle associated with the swing arm and

adapted so that a user may move the swing arm and blade toward the workpiece." Ramsden fails to disclose such a handle. The claims also require "a detection system adapted to detect contact between a person and the blade," and Ramsden fails to disclose such a detection system.

Original claims 26, 28 and 29 also recite a "miter saw," and therefore they distinguish Ramsden. Nevertheless, those claims have been amended to expressly require "a swing arm above and pivotally attached to the base" and "a handle associated with the swing arm and adapted so that a user may pivot the swing arm and blade toward the base." The cited references all fail to disclose such a swing arm or handle.

Claims 26, 28 and 29 also include the following means-plus-function limition: "reaction means ... for causing a predetermined action to take place upon detection of the dangerous condition." That limitation must be construed to cover the corresponding structure disclosed in the specification and equivalents thereof. None of the cited references disclose the structure shown in applicant's specification or equivalents thereof.

3. Claim 27.

The Examiner did not address claim 27. Applicant asserts that claim 27 is allowable for the reasons stated above concerning claim 26.

4. Double Patenting.

The Examiner provisionally rejected claims 20, 21, 23, 25, 28 and 29 under the judicially created doctrine of obviousness-type double patenting. Applicant traverses that provisional rejection. Nevertheless, claims 23 and 25 have been cancelled without prejudice, so the provisional rejection as to those claims is moot. As to the other claims, applicant understands that this rejection may be withdrawn when it is the only rejection remaining in this application (see MPEP §804), and therefore applicant requests that the discussion of this rejection be postponed pending resolution of the issues discussed above.

Respectfully submitted,

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